MACALLUM, Archibald Byron = Professor of Bio-chemistry; October 1918—May 1919 (040)

The limitations of the equipment at present have caused no great inconvenience to the Commission, but the time is fast approaching when further research work will become necessary and the adding of additional equipment to that already in use by the Commission. I am attaching hereto a list of the most important items of the laboratories equipment.

Should you desire any further information or details in regard to the laboratories of the Commission, we shall only be too pleased to furnish same upon request.

I am,

Yours truly,

(Sgd) F. A. Gaby

Chief Engineer.

Dr. A. B. Macallum,
Honorary Advisory Council for Scientific and
Industrial Research,
OTTAWA, Ontario.

October 25th, 1918

Dr. A. P. Macallum, F.R.S.,

Chairman, Advisory Committee on Industrial and Scientific Research,

Ottawa.

Dear Dr. Macallum:

At a meeting of the Board of Governors which was held yesterday I read a communication from Professor Brailsford Robertson stating that the apparatus which you had used in your Department for your own special researches will not be of such special advantage to him in his work but that the Department might easily allow you to have it. I am glad therefore to be able to say on behalf of the Governors that if you still wish to have the apparatus with which you have done so much work they will be glad to make the arrangements with regard to it which you suggested.

With kind regards, I am,

Yours sincerely,

President.

November 8th, 1918

Professor A. P. Macallum, F.R.S.,

Advisory Council for Scientific and Industrial Research,

Ottawa, Ont.

Dear Professor Macallum:

I have consulted with Sir Edmund Walker and if Friday, November 22nd, will suit your Committee, he will call the Board of Governors to meet you on that day. Would you kindly let me know as soon as possible your decision ?

Yours sincerely,

President.

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Ottawa, Dec. 3rd, 1918.

Sir Robert A. Falconer, K.C.M.G.,
President, University of Toronto,
Toronto.

Dear Sir Robert,-

I enclose herewith copy of a letter received from Mr. Frederick A. Gaby, Chief Engineer of the Hydro Electric Power Commission, giving in detail an account of the equipment of the laboratories of the Commission and the work which they do. You will note, from the description, how extensive is the outfit of these laboratories in apparatus, and what research work is being done in them.

It seems to me that these laboratories should be, in some way or other, associated with the University of Toronto, in order that students who are planning for a career as electrical engineers may have all the opportunities that they offer.

I have spoken on this subject to Mr. Gaby, and he seemed to be quite willing that the laboratories should be associated with the University of Toronto for teaching purposes. I understand that on the staff there are a number of very highly qualified technical experts, whose services for occasional instruction might very well be utilized.

I would suggest that you make inquiries on this subject for the purpose of determining how far the laboratories referred to can be affiliated with the University.

Yours sincerely,

A. B. Macallum

ABM/CC.

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HYDRO-ELECTRIC POWER COMMISSION

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190 University Avenue,
Toronto,

October 12th, 1918.

Dear Dr. Macallum,-

Referring to our recent conversation in which you requested information on the work of the Laboratories of the Commission, and the equipment installed for scientific tests and research work, the following will give you a resume of the organisation and duties of the Testing Laboratories of the Commission. The Laboratories have been installed primarily to carry out the testing and laboratory work of the Commission, and have been fully equipped for electrical and physical tests on materials as well as photometry and photography:-

Organization and Duties.

The duties of the laboratories are to conduct tests for the various departments of the Commission; to investigate phenomena of a destructive or troublesome character which may arise in the operation of the system and to make recommendations and develop apparatus and methods for the protection of the system against such destructive agencies; to conduct researches in connection with problems having a direct bearing upon the operation of the system, the solution of which will be of advantage

to the Hydro-Electric Power Commission in its work of generating and distributing power; to originate and undertake researches of the above-mentioned character; to act in a consulting capacity to the various departments of the Commission on subjects of a highly theoretical or technical nature; to examine electrical devices and fittings manufactured or offered for sale in Ontario, to determine whether the same may be approved for use as reasonably free from fire or accident hazard; to conduct a re-examination service in connection with the above; and to inspect materials of construction for various departments of the Commission.

The laboratories is divided into the following sections:-

1. High tension and electrical testing laboratory, including the approval laboratory.
2. Meter and standards laboratory.
3. Photometric laboratory.
4. Photographic laboratory.
5. Structural Materials laboratory.

The attached charts illustrate graphically the organization.

The number of employees in each section is at present as follows:-

High tension	8
Approval	4
Meter and Standards	4
Photometric	2

Photographic	4
Structural	8
Clerical	3

Description of work done in the laboratories.

The testing work of the laboratories may be derived into two main classes ;- routine tests and special tests including research. In general the same members of the staff are engaged in both classes of work, as the staff is not large enough to permit of certain individuals spending all their time in special work and research. There are however, three members of the staff who spend over ninety per cent of their time in special test work and who have considerable time to devote to research.

For the purposes of this report routine tests are defined as those which occur with sufficient frequency to become a daily occupation and which are standardized as to method of procedure. Other tests are regarded as special.

The work of each section will be treated in detail.

High Tension and electrical testing laboratory.

The routine work of this laboratory includes tests on transformers, motors, generators, and other electrical machinery made in accordance with standard methods of electrical testing to determine the efficiency and other characteristics. These tests are made for the Purchasing Department to serve as a guide in buying or for other departments of the Commission. Among the

routine work may also be classed tests on linemen's rubber gloves, transformer oil, high tension insulators, etc.

The special tests conducted include the investigation of new type of electrical machinery appearing on the market, insulating materials, high tension fuses, etc., as well as the investigation of unusual and troublesome conditions appearing on the system. These latter tests usually involve work outside the laboratories and sometimes involve several days' tests in the field. Research work is being carried on in this laboratory in connection with high tension insulators, measurement of voltages over 300,000 testing equipment for high tension lines, dielectric losses in cables, and development of portable apparatus for wave form determination.

The approval laboratory is at present a part of the electrical testing laboratory. This laboratory was organized to conduct the laboratory testing and re-examination of electrical devices and fittings manufactured or offered for sale in Ontario, in accordance with the notice of the Commission Jan. 1 - 1918. The object of the Commission in undertaking this work is to set forth and maintain standards for the design and construction of electrical devices and fittings which will render the same reasonably free from fire and accident hazard.

Each manufacturer of a new electrical device is required to submit the same for test by the laboratory and final approval by the Commission.

This work may be considered as research insofar as it adds to the safe use of electricity by the public, and in this respect it is of great importance to the public. An important service is also rendered to the manufacturers of electrical apparatus by the laboratory in giving them suggestions as to improvements in their products.

The equipment of the high tension and electrical testing laboratory includes motor-generator sets supplying alternating power at 25 to 60 cycles and direct current; portable meters of various ranges, testing switchboards designed to facilitate routine testing, motors, testing transformers, etc. Testing voltages at 60 cycles are available up to 300,000 and at 25 cycles to approximately 200,000. A Tesla coil, designed and constructed in the laboratory, supplies high frequency currents.

Other equipment of a miscellaneous character is also installed in this laboratory. In the approval laboratory are installed apparatus for testing all kinds of electrical fittings which may come within the province of this section.

Meter and standards laboratory.

The duties of this laboratory are to maintain accurate standards of electrical measurement for the Commission, to test and repair electrical meters of all kinds, to conduct investigations in connection with electrical measurement, and to act in a consulting capacity on matters of electrical measurement.

A great deal of work is done in repairing and testing watthour meters, graphic meters, and portable meters of various types. A workshop equipped with a precision lathe is part of this department, in which equipment of various kinds is constructed for the laboratories.

The equipment includes portable and laboratory standard instruments, potentiometers, standard cells, standard resistances, resistance bridges, capacities, inductances, etc.. Also test benches designed to facilitate meter testing.

Photometric Laboratory.

The work of this laboratory includes the testing of incandescent electric lamps, reflectors, shades and other electric lighting accessories; also any work in illuminating engineering which may arise. The Commission purchases its supplies of lamps under specification and it is the duty of this section of the laboratories to determine whether the lamps received meet the specifications.

The equipment for this work includes bar and integrating sphere photometers and test racks for the determination of the life of lamps. There is also a 20 foot bar photometer fitted with rotating mirrors, which is used to determine distribution curves and efficiency of lighting units.

Structural Materials Laboratory.

This laboratory makes tests of materials of construction such as iron, steel and other metals, cement, stone,

sand etc. A chemical laboratory also forms part of its equipment. This section of the laboratories also handles a good deal of field inspection of materials, for the Construction Department.

The research work at present in progress in this section deals with the discovery and investigation of sources of construction materials in Ontario, such as sand, gravel, stone, etc. and the compilation and distribution of such data for the benefit of the various departments of the Commission; with investigations of the properties of paints, gasoline, lubricating oils, etc. with improvements in methods of testing tar, zinc coatings on steel; with methods of recovery of lubricating oil after being used in automobiles; with improvements in design of beams, or other structural members. An important investigation now occupying the attention of this laboratory is the determination of curves which may be used by construction men in the field as a guide in mixing the constituent materials entering into concrete, taking into account the properties of the materials available. It is hoped that information of value will be obtained as a result of this investigation.

The equipment of this laboratory is quite complete as regards cement testing and includes chemical equipment for quantative tests, testing machines for tension and compression tests, extensometers and moisture apparatus.

Photographic laboratory

This section is equipped for all kinds of photographic

work and is maintained to furnish such service to the various departments as may be required.

The equipment of the laboratories as outlined above is sufficient to enable us to do research work of a varied nature, but not certain kinds usually done by universities. The equipment was installed originally to meet the requirements of commercial testing but such additions as have been made were selected having in view the possibility of their being used for research as well as routine testing. We believe that the equipment is in its present state quite suitable for many classes of engineering research. It has certain limitations, which, however, have not yet proved inconvenient. For example, we have no means for producing variations in wave-form such as would be required in investigation iron losses meter accuracy or di-electric losses, etc. under varying conditions of wave-form. There is available no source of sustained high frequency waves, the Tesla coil giving a damped wave. Our equipment does not include certain apparatus for making refined photometric researches involving color differences but it is fairly complete for the purposes of commercial photometric testing. There is no means for automatically maintaining a constant temperature in the electrical standards room nor is there an accurate time-keeping standard in the laboratories.

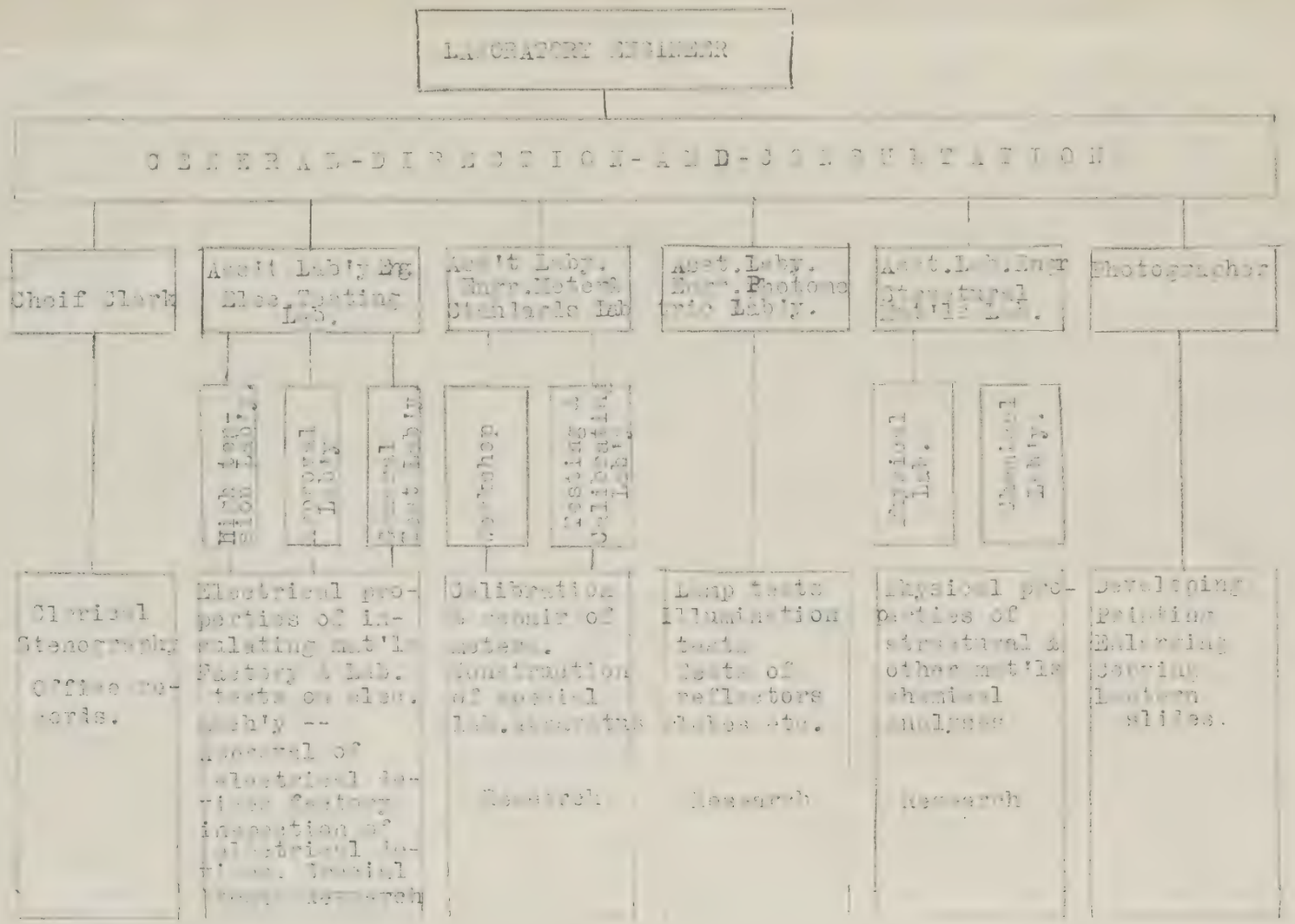
The laboratories is not yet in a position to set up primary standards of electrical measurement, i.e. to construct

standard cells, standard resistance, silver voltameters, etc. as this work is not within our province and is unnecessary since such standards are maintained at the Bureau of Standards, Washington, to whom we have recourse for comparison of our secondary standards.

I would point out the necessity for an organization in Canada of this kind, which would maintain primary standards in close agreement with those of United States, Great Britain and France. The Department of Inland Revenue has in custody the standards of weights and measures for Canada, but in respect of electrical standards it is my understanding that they are dependent upon the United States and the National Physical Laboratory of Great Britain and are thus on the same level as our own laboratories. The need for a bureau of Standards in Canada is, I believe, very great at the present time.

The chemical laboratory is not at present very completely equipped but additions are made to the equipment from time to time as required. The chemist employed is a graduate of the Toronto Technical School but not of a University. However, he is able to do practically all the chemical work so far required by us, and the laboratory has been able to give valuable information to the other departments of the Commission. In a case which arose recently we were able to show that a certain company had violated its agreement in supplying a casting containing no nickel whereas the specifications called for four per cent.

LABORATORY ORGANIZATION



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HONORARY ADVISORY COUNCIL
FOR
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Ottawa, Ontario,

December 28, 1918.

Dear Sir Robert:-

A number of students in science, who have not completed their undergraduate courses in the various universities of Canada, and who are overseas, desire to return at the earliest possible date to complete their courses for graduation with the minimum loss of time. Some of these have appealed to the Research Council to take steps to facilitate their release from service and return to Canada.

As it is inadvisable to take such steps for a few, I would be pleased if you would give me, from the list of students of your institution, the names of those who are similarly situated, in order that a complete list of such may be presented to the Militia Department, for their immediate discharge, if that result can possibly be attained.

The students for whom the Research Council could appeal best in this case would be those in chemistry, physics, metallurgy, chemical engineering, mining engineering and electrical engineering.

Appreciating the favor of an early reply, I am,

Yours sincerely,

A. B. Macallum

Sir Robert A. Falconer,
President,
University of Toronto,
Toronto.

AB/JC.

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Ottawa, Jan. 4th, 1919.

Sir Robert A. Falconer, K.C.M.G.,
President, University of Toronto,
Toronto.

Dear Sir Robert,- Re Successor to Prof. Barnes as Secretary of Canadian Branch, British Science Guild.

I have your letter of Dec. 24th, accompanied by the letter of Lieut. Col. O'Meara, Honorary Secretary of the British Science Guild, and a copy of a letter to Miss Lacey from Mr. H. E. Reilley of McGill University, addressed to the Secretary of the British Science Guild, informing her that Dr. Barnes is not able any longer to fulfil the duties of Secretary to the Canadian Branch of the Guild.

A year ago Prof. Barnes informed me that he desired to resign his position as Secretary of the Guild and asked me to take on the duty of endeavouring to find a successor. I did not accept this at the time, but it seems unavoidable now, as Dr. Barnes' condition is such as to preclude his ever being active in this or any other capacity again.

I shall bring the matter before the Research Council at an early date and will let you know the conclusion reached.

Please accept for yourself and Lady Falconer my best wishes for A Happy New Year.

Yours sincerely,

A. B. Macallum

ABM/CC.

January 7th, 1919

Dr. A. H. Macallum, F.R.S.,

Advisory Council of Scientific and Industrial Research,

Ottawa.

Dear Dr. Macallum:

With regard to your letter of Dec. 23 asking for a list of students overseas who wish to return to complete their courses for graduation I am afraid it would be impossible to secure the information as all that we could send would be a list of all students who are overseas, though many of these may have returned home by this time and of most of the others we know nothing as to their intentions.

I have been asked again and again to have men returned and the procedure I have taken has been to write to Sir Edward Kemp requesting him to secure from the Imperial Authorities permission for our men who are in the Imperial forces to return, and also to take such steps as to allow men who are in our own army to get back as soon as possible. At least they should all be here so as to begin work next October. We may find it necessary to inaugurate classes in the spring to carry them over the session.

Wishing you a good New Year,

I am, Yours sincerely,

President.

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HON. REC. SEC.

Ottawa, May 16th, 1919.

Sir Robert A. Falconer, K.C.M.G.,
President, University of Toronto,
TORONTO.

Dear Sir Robert,-

I beg to acknowledge your communication of May 10th, in recommendation of Mr. A. H. Leim, as a candidate for one of the Studentships instituted by the Research Council.

His application will be considered at the next meeting of the Council, to be held early in June, and your testimonial in his favor will play a part in the decision which the Committee will reach regarding it.

Yours sincerely,

A. B. Macallum

ABM/CC.

May 10th, 1919

Dr. R. F. Ruttan, F.C.S.,

Chairman, Honorary Advisory Council for Scientific and Industrial Research,

Ottawa, Ont.

Dear Dr. Ruttan:

I understand from Professor Denslow that Mr. Alexander Leacy Peir of the graduating class in Biology is making application for a studentship under section 4 of the regulations of the Research Advisory Council. Dr. Denslow reports that Mr. Peir is entirely satisfactory. He has a Matriculation Scholarship and two University Scholarships to his credit, has done some preliminary work in research collaboration at my request, and he expects to work in Marine Biology under Dr. Knudson with a view to going ultimately into the economic field. In view of these facts I have much pleasure in endorsing his application.

Yours sincerely,

President.